Available online at http://journal-of-agroalimentary.ro

Journal of Agroalimentary Processes and Technologies 2026, 32 (1), 79-85

Journal of Agroalimentary Processes and Technologies

The Accumulations of Element Quantities in Different Parts of Some Fruits

Ayşegül Korkmaz[1], Nurhan Uslu[2], Mehmet Musa Özcan[2*], Nesim Dursun[1]

[1]*University of Selçuk, Department of Soil Science and Plant Nutrition, Faculty of Agricultural, 42031, Konya-Turkey*

[2]*Selcuk University, Faculty of Agriculture, Department of Food Engineering, 42031 Konya, Turkey*

**Corresponding author: mozcan@selcuk.edu.tr*

Received 7 February, 2026; Revised 21 March, 2026, Published 29 March, 2026

Abstract

This study aimed to examine the distribution of macor, micro and toxic element quantities of different parts of different stone fruit varieties widely produced and consumed in Turkey. In addition to analytical procedures, spectrophotometric and chromatographic methods were used in carrying out the study. P amounts of apricot and peach fruit and their parts were defined to be between 393.01 (fresh fruit) and 3541.19 mg/kg (seed) to 294.53 (fresh fruit) and 9310.41 mg/kg (seed), respectively. P contents of plum fruit samples varied between 596.18 (fresh fruit) and 3973.78 mg/kg (seed shell). K amounts of plum fruit and parts were specified to be between 1277.17 (seed) and 9635.94 mg/kg (dry fruit). The fruit part containing the highest average K was dried fruit (13561.94 mg/kg), followed by fruit pulp, fruit peel, seed, fresh fruit and seed shell in decreasing order. Al amounts of apricot and peach fruits and parts were defined to be between 275.60 (fruit shell) and 1116.06 mg/kg (seed) to 128.59 (fresh fruit) and 1815.96 mg/kg (seed), respectively. The highest average Fe in fruit parts was observed in fruit peel. The toxic element found in the highest amounts in fruits was Al.

***Keywords*:** Stone fruits (apricot, peach, plum), elements, Inductively coupled plasma optical emission spectroscopy (ICP-OES) .

1. Introduction

Fruits provide many nutritional components needed in the treatment of many diseases and malnutrition. Fruits with endocarp and single stones, such as peaches, nectarines, plums, cherries, apricots, almonds, mangoes and dates, are an important category that contribute significantly to the provision of nutrients [1]. Minerals, known as inorganic residues remaining after the burning of plant tissue, consist of elements such as potassium, sodium, calcium and magnesium, as well as boron and iron, and are found in abundance in fruits such as plums [1-]. Total ash amount in Serbian plum varieties has been reported as an estimate of 4.54% [4]. The production of food products in various forms such as jam, juice, concentrate, and paste results in large amounts of fruit by-products such as peel, seeds, and pulp, which are considered waste [5, 6]. The disposal of pulp, which contains parts such as peels and seeds, is a significant problem for processing companies, as it is considered a by-product of all fruit processing industries [7, 8].

The presence of toxic elements in the soil, which are among the most dangerous substances in the environment, can cause contamination of plants and therefore the food we obtain from plants. Since toxic heavy metals such as Cadmium and Lead (Pb) cause serious health problems in humans, consumption of fruits and vegetables

Citation: A.Korkmaz, N.Uslu, M.M. Özcan, N. Dursun. The accumulations of element quantities in different parts of some fruits, *Journal of Agroalimentary Processes and Technologies* 2026, 32 (1), 79-85.
DOI: 10.59463/JAPT2026.1.10

contaminated with toxic elements is the main reason for the passage of toxic metals into the human body [9]. Because of the high mobility of cadmium, it can easily enter the plant roots and be easily transported from the roots to the aerial parts of the plant, plants grown in contaminated soils are exposed to high levels of cadmium toxicity and can pass to humans in this way, causing health problems [10]. Another study reported that one of the main factors that increases the mobility of Cd in the soil and its absorption by plant roots is the increase in the acidity of the soil [11]. Lead (Pb), a naturally occurring and versatile toxic element with significant effects on human health at high levels, poses a serious problem for agriculture by causing a serious reduction in crop productivity when contaminated with soil [12]. Little information is available on the macro, micro and toxic element quantities of some stone fruits and their parts. There is no comprehensive study covering the determination of the element contents of the fruit parts used in this study. The objective of present investigation was to determine the distribution of macro, micro and toxic element quantities of the parts of different fruits widely produced and widely consumed in theTurkey.

2. Material and methods

2.1. Material

Fruits (apricot, peach and plum) were purchased from a greengrocer in Konya. 3 kg of each fruit variety was taken, and the fruit parts (the peel, pulp, fruit shell, seeds, seed shell) of the fruits brought to the laboratory were carefully separated with a knife the fruits used in this study were purchased from Konya province in Türkiye (Fig 1.)

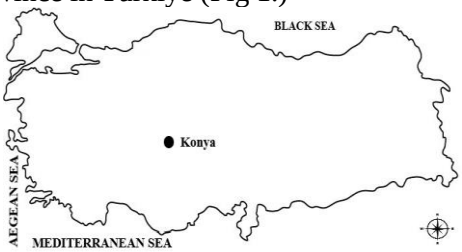

Figure 1. Location of the fruits used in this study.

2.2 Methods

2.2.1 Element analysis of the fruit parts

After the fruit parts dried at 70 ºC were ground in the mill, 0.2 g of each sample was taken and weighed into a graduated flask. After adding 5 ml of 65% HNO_3 and 2 ml of 30% H_2O_2 were added to each weighed fruit piece, the mixture was burned in a closed microwave system (Cem-MARS Xpress) at 210 ºC and 200 PSI. After this process, the mixture was completed to 20 ml with distilled water, and elements were determined by the ICP-OES equipment [13].

2.3. Statistical Analysis

Data from three replicate analyzes were equalized and analysis of variance was performed. Significant differences between the results of the fruit parts were assessed by Duncan's multiple range test ($p < 0.05$).

3. Results and discussion

3.1. Macro element contents of different fresh and dry parts of some stone fruit and their parts

Macro element amounts of different fresh and dry parts of some stone fruit varieties (fresh fruit, dried fruit (with shell), dried fruit pulp, dried shell, dried seed, seed shell) are given in Table 1. P contents of fresh fruits were found to be at very low levels compared to other samples. P amounts of apricot and peach fruit and their parts were defined to be between 393.01 (fresh fruit) and 3541.19 mg/kg (seed) to 294.53 (fresh fruit) and 9310.41 mg/kg (seed), respectively. P contents of plum fruit samples varied between 596.18 (fresh fruit) and 3973.78 mg/kg (seed shell). As seen in Table 1, the P content of plum seed shell was considerably higher than that of apricot and peach. In general, the highest average phosphorus content was detected in peach, followed by plum and apricot in decreasing order. The highest average phosphorus among fruit parts was detected in fruit seeds (4686.86 mg/kg). K quantities of apricot and peach samples were characterized to be between 859.88 (seed shell) and 20019.94 mg/kg (dry fruit) to 751.38 (seed shell) and 20647.37 mg/kg (fruit pulp), respectively. In addition, K amounts of plum fruit and parts were specified to be between 1277.17 (seed) and 9635.94 mg/kg (dry fruit). Among the fruits, the highest average K was found in peach fruit, followed by apricot and plum in decreasing order. The fruit part containing the highest average K was dried fruit (13561.94 mg/kg), followed by fruit pulp, fruit peel, seed, fresh fruit and seed shell in decreasing order. While Ca amounts of the apricot fruit

and parts are established between 237.52 (seed shell) and 2304.43 mg/kg (fruit shell), Ca quantities of peach and their parts were found to be between 51.41 (fresh fruit) and 4864.76 mg/kg (seed). Also, Ca amounts of plum and parts were found between 72.22 (fresh fruit) and 1859.72 mg/kg (seed shell). The highest average Ca in fruits was detected in peach, followed by apricot and plum in decreasing order. However, the highest Ca in fruit parts was detected in fruit peel (1468.26 mg/kg). Mg quantities of apricot and peach fruits were determined to be between 107.60 (fresh fruit) and 1951.18 mg/kg (seed) to 30.39 (fresh fruit) and 6855.53 mg/kg (seed), respectively. Mg contents of plum fruits changed between 72.79 (fresh fruit) and 2324.12 mg/kg (seed shell). The highest average Mg (1641.59 mg/kg) was detected in peach. In addition, the highest average Mg among fruit parts was detected in the seed (2986.86 mg/kg).

3.2 Micro element contents of different fresh and dry parts of some stone fruit and their parts

Microelement contents of fresh and dried fruit parts are shown in Table 2. The microelement found in the highest amounts in fruits was Fe, followed by Zn, Mn and Cu in decreasing order. Fe amounts of apricot and peach fruits and their parts were established to be between 4.64 (seed shell) and 41.05 mg/kg (fruit shell) to 1.36 (fresh fruit) and 86.96 mg/kg (fruit shell), respectively. Also, Fe quantities of plum and their parts ranged from 2.94 (fresh fruit) to 34.20 mg/kg (seed shell). The highest average Fe in fruits was detected in peach, followed by apricot and plum fruits in decreasing order. The highest average Fe in fruit parts was observed in fruit peel. While Zn amounts of apricot fruit are characterized between 2.52 (seed shell) and 26.93 mg/kg (seed), Zn quantities of peach fruit samples were stated to be between 1.14 (fresh fruit) and 59.15 mg/kg (seed). In addition, plum fruit contained Zn between 2.31 (fruit pulp) and 31.11 mg/kg (seed shell). The highest amounts of Zn in fruits and fruit parts were detected in peach and pit, respectively. Mn amounts of apricot and peach fruits were characterized to be between 0.40 (fresh fruit) and 8.24 mg/kg (seed) to 0.45 (fresh fruit) and 27.59 mg/kg (seed), respectively. Also, Mn quantities of the plum fruits were defined to be between 0.59 (fresh fruit) and 20.20 mg/kg (seed shell). The highest mean Mn content was found in peach, followed by plum and apricot in decreasing order. However, among the fruit parts, the highest mean Mn content was found in the seed. Cu quantities of apricot and peach fruits were assessed to be between 0.440 (fresh fruit) and 6.02 mg/kg (seed) to 0.45 (fresh fruit) and 18.39 mg/kg (seed), respectively. Cu amounts of the plum varied between 0.59 (fresh fruit) and 10.88 mg/kg (seed shell). The highest average Cu was determined in peach.

The highest average Cu among fruit parts was determined in the seed.

3.3 Toxic element contents of different fresh and dry parts of some stone fruit and their parts

Toxic element contents of some stone fruits and fruit parts are given in Table 3. The toxic element found in the highest amounts in fruits was Al, followed by B, Cd, Cr, Co, Bi, Ba and Ag in decreasing order. Al amounts of apricot and peach fruits and parts were defined to be between 275.60 (fruit shell) and 1116.06 mg/kg (seed) to 128.59 (fresh fruit) and 1815.96 mg/kg (seed), respectively. Al contents of plum samples varied between 451.22 (fruit shell) and 1053.24 mg/kg (seed shell). Among the fruits, the highest average Al content was detected in apricot, followed by peach and plum in decreasing order. Among the fruit parts, the highest average Al was detected in the seed (1260.60 mg/kg). While B contents of apricot samples are assessed between 3.56 (fresh fruit) and 23.39 mg/kg (dry fruit), B amounts of peach samples were determined between 2.49 (fresh fruit) and 30.95 mg/kg (dry fruit). Also, B contents of plum samples were determined to be between 4.11 (fresh fruit) and 31.50 mg/kg (fruit shell). Among the fruits and fruit parts, the highest amounts of B content were detected in plum (18.36 mg/kg) and fruit peel (22.80 mg/kg), respectively. Cd quantities of apricot and peach samples were characterized to be between 5.99 (fresh fruit) and 11.49 mg/kg (fruit pulp) to 3.40 (fresh fruit) and 68.96 mg/kg (seed), respectively. In addition, Cd contents in plum fruit parts were determined between 8.21 (fresh fruit) and 23.35 mg/kg (seed shell). Cr quantities of apricot and peach samples were recorded to be between 3.19 (dry fruit) and 6.01 mg/kg (seed) to 1.811 (fresh fruit) and 32.17 mg/kg (seed), respectively.

Table 1. Macro element contents of stone fruit and their parts (mg/kg)

	P				K				Ca				Mg			
Fruit parts	**Apricot**	**Peach**	**Plum**	**Mean**	**Apricot**	**Peach**	**Plum**	**Mean**	**Apricot**	**Peach**	**Plum**	**Mean**	**Apricot**	**Peach**	**Plum**	**Mean**
resh fruit (Mesocarp)	393.01 O*	294.53 1	596.18 N	**427.91 F**	2925.38 M	1760.93 N	1371.29 O	**2019.20 E**	335.37 L	51.41 P	72.22 O	**152.99 F**	107.60 P	30.39 Q	72.79 R	**90.26 F**
Dry fruit (Mesocarp)	1264.29 H	1763.45 F	1807.20 E	**1611.65 C**	20019.94 B	11029.94 E	9635.94 G	**13561.94 A**	888.08 G	1584.47 F	457.71 J	**976.75 D**	655.44 G	854.48 E	371.61 K	**627.18 D**
Pulp	1044.85 L	2232.39 D	1362.10 G	**1546.45 D**	11914.25 D	20647.37 A	6487.39 J	**13016.34 B**	1720.12 E	2784.59 B	825.06 H	**1176.59 B**	560.81 H	1045.64 D	306.10 L	**637.52 C**
Fruit skin	1114.60 K	2242.08 D	1158.63J	**1505.10 E**	10236.39 F	17384.08 C	6529.78 I	**11383.42 C**	2304.43 C	1851.26 D	249.10 N	**1468.26 C**	553.95 I	840.93 F	379.29 J	**591.39 E**
Seed	3541.19 C	9310.41 A	1208.99 I	**4686.86 A**	6149.13 K	7440.13 H	1277.16 P	**4955.47 D**	727.34 I	4864.76 A	363.40 K	**1985.17 A**	1951.18 C	6855.53 A	153.88 N	**2986.86 A**
Seed skin	371.09 P	641.13 M	3973.78B	**1662.00 B**	859.88 Q	751.38 R	4413.13 L	**2014.13 E**	237.52 N	318.77 M	1859.72 D	**805.34 E**	149.25 O	162.55 M	2324.12 B	**878.64 B**
Mean	**1288.17 C**	**2747.33 A**	**1684.48 B**		**8684.16 B**	**9835.64 A**	**4955.45 C**		**1035.47 B**	**1909.21 A**	**637.87 C**		**663.04 B**	**1641.59 A**	**601.30 C**	

(*P<0.05)

Table 2. Mico element contents of stone fruit and their parts (mg/kg)

Fruit parts	Fe				Zn				Mn				Cu			
	Apricot	**Peach**	**Plum**	**Mean**	**Apricot**	**Peach**	**Plum**	**Mean**	**Apricot**	**Peach**	**Plum**	**Mean**	**Apricot**	**Peach**	**Plum**	**Mean**
Fresh fruit (Mesocarp)	5.95 M*	1.36 P	2.94O	**3.42 F**	1.21L	1.14L	2.34K	**1.56F**	0.40 R	0.45Q	0.59P	**0.48F**	0.440P	0.45O	0.59N	**0.48F**
Dry fruit (Mesocarp)	30.96 G	38.90E	18.54 H	**29.47C**	9.82 E	5.31 G	4.64H	**6.59 C**	4.52 H	7.08D	6.61F	**6.07C**	0.76M	1.77 L	3.32G	**1.95E**
Pulp	6.12 M	8.96 L	4.63 N	**6.57 E**	3.07I	9.82 E	2.31K	**5.07E**	0.77 O	4.08J	1.77 M	**2.21 E**	2.30 J	5.70 D	2.32J	**3.44D**
Fruit skin	41.05 D	86.96A	10.88K	**46.30 A**	4.40H	9.01 F	5.16G	**6.18D**	1.89 L	6.99E	5.76G	**4.88D**	2.51I	6.02C	3.42 F	**3.98 C**
Seed	17.23 I	50.57C	12.56J	**26.79D**	26.93	59.15A	2.80IJ	**29.63A**	8.24C	27.59A	4.16I	**13.33 A**	6.02C	18.39A	2.80H	**9.07A**
Seed skin	4.64 N	40.11B	34.20F	**36.31B**	2.52JK	24.22D	31.11 B	**19.29 B**	1.26 N	3.77K	20.20B	**8.41B**	2.12K	3.76 E	10.88B	**5.59 B**
Mean	**17.66B**	**42.81A**	**13.96 C**		**7.99B**	**18.11A**	**8.06B**		**2.85C**	**8.33A**	**6.51 B**		**2.35C**	**6.02 A**	**3.89 B**	

(*P<0.05)

Table3. Toxic element contents of stone fruit and their parts (mg/kg)

(Mesocarp)																
Dry fruit (Mesocarp)	23.39D	30.95B	24.51C	**26.28A**	0.76GH	0.89E	0.66I	**0.77C**	1033.80F	1311.89B	645.09 I	**996.93B**	0.76I	1.77C	0.66J	**1.06C**
Pulp	19.15J	22.82 F	21.49G	**21.15C**	0.77G	0.82F	0.59K	**0.72E**	821.08 H	204.99 P	59.53 R	**361.86F**	0.76I	0.81H	0.81H	**0.79E**
Fruit skin	17.56 L	19.89I	31.50A	**22.80 B**	0.62J	0.99D	0.58L	**0.74D**	275.60 O	404.80 M	451.22L	**377.20E**	1.25F	1.99 B	0.91G	**1.38B**
Seed	17.97K	22.96 E	8.36 M	**16.43D**	0.75 H	4.60A	1.40C	**2.25A**	1116.06C	1815.96A	849.79G	**1260.60A**	0.90G	4.60A	1.40E	**2.30A**
Seed skin	3.80 O	3.77 O	20.21H	**9.26E**	0.42 M	0.75GH	1.55B	**0.91B**	372.75 N	557.44 J	1053.24D	**661.14C**	0.76 I	0.76 I	1.55D	**1.10 D**
Mean	14.24C	17.15 B	18.36A		0.62 C	1.38A	0.89B		777.29 A	737.28 B	585.46 C		0.87C	1.72 A	0.96B	

Table3. Toxic element contents of stone fruit and their parts (mg/kg) (continued)

Fruit parts	**Bi**				**Cd**				**Co**				**Cr**			
	Apricot	**Peach**	**Plum**	**Mean**	**Apricot**	**Peach**	**Plum**	**Mean**	**Apricot**	**Peach**	**Plum**	**Mean**	**Apricot**	**Peach**	**Plum**	**Mean**
Fresh fruit (Mesocarp)	1.57O*	1.13 P	2.95K	**1.88F**	5.99 GH	3.40H	8.21EFG	**5.87 D**	0.40M	0.23N	0.59J	**0.40F**	5.29I	1.811P	4.64K	**3.23F**
Dry fruit (Mesocarp)	3.02J	3.53F	2.65L	**3.07D**	11.38DE	9.27D-G	9.94DEF	**10.18C**	0.75H	0.89G	0.61I	**0.75D**	3.19O	7.07D	4.69J	**5.66C**
Pulp	3.07I	3.27G	2.13M	**2.88E**	11.49CDE	12.22CD	8.74 D-G	**10.82C**	0.76H	0.62I	0.57K	**0.65E**	5.40H	5.70G	4.64K	**5.23D**
Fruit skin	3.14H	3.99 D	2.30M	**3.14C**	9.41D-G	14.99C	8.68 D-G	**11.03C**	0.88G	0.99E	1.03D	**0.97 B**	3.75M	6.99E	4.02L	**4.92E**
Seed	3.02J	18.39A	5.58C	**8.99A**	11.25 DE	68.96A	19.78 B	**33.33A**	0.92F	4.60A	1.40 C	**2.30A**	6.01 F	32.17A	12.58B	**16.92A**
Seed skin	1.69N	3.77E	6.21B	**3.89 B**	11.30DE	6.34FGH	23.35 B	**13.66B**	0.42L	0.75H	1.55B	**0.91B**	3.38N	5.29I	12.44C	**7.04B**
Mean	**2.58C**	**5.68A**	**3.68B**		**9.30 C**	**20.02A**	**13.11B**		**0.69 C**	**1.35 A**	**0.96 B**		**4.50 C**	**9.84 A**	**7.17 B**	

Also, plum samples contained Cr between 4.02 (fruit shell) and 12.58 mg/kg (seed). Among the fruits and fruit parts, the highest average Cr amounts were detected in peach (9.84 mg/kg) and seed (16.92 mg/kg). However, the highest average Bi, Ba and Ag contents in fruits and fruit parts were detected in peach (5.68) and seed (8.99 mg/kg), peach (1.72) and seed (2.30 mg/kg), and peach (1.38 mg/kg) and seed (2.25 mg/kg) samples, respectively. As understood from Table 3, the highest average toxic element concentration was found in peach fruit and the core part of the fruits (except B). Plum fruit contained 0.78% nitrogen, 0.06% phosphorus, 1.45% potassium, 0.07% calcium, 0.016% magnesium, 19.37% iron, 10.21 μg/g manganese, 3.21 μg/g copper, 19.29 μg/g zinc and 22.83 μg/g boron on a dry weight basis [4]. K contents of the peel and pulp parts of apple cultivars were described to be between 115.1 and 165.1 mg/100g to 77.2 and 107.7 mg/100g, respectively [14]. While Ca contents of the apple peels are determined between 9.8 and 17.9 mg/100g, Ca amounts of the apple pulps were assayed to be between 4.0 and 4.7 mg/100g [14]. In addition, Mn contents of apple peel and pulp parts were established to be between 0.14 and 0.39 mg/100g to 0.02 and 0.03 mg/100g, respectively [14]. The results showed some differences compared to previous studies conducted on apple pieces. These differences can be likely due to fruit type, growing conditions and analytical factors.

As a result, phosphorus content of fresh fruits was found to be quite low compared to other fruit parts. In addition, P was found at the highest levels in the seed shell of apricot and peach. In general, fruits and fruit parts are rich in P, K, Ca content. P, K and Ca amounts of peach were found to be higher than apricot and plum fruit. P and Mg element contents were detected mostly in the core part. In fruit parts, the most microelements were localized in the seed. In addition, the highest average microelements in fruits were detected in peach. Fe content of peach fruit was found to be higher than apricot and plum. In addition, the highest amounts of toxic element contents were determined in peach. The high toxic element contents in peach and its parts may be due to the synthesis of toxic components in the seed and seed nest, and the ability of the peach plant to absorb toxic elements from the soil may be higher than other fruits and may have different physiological properties.

4. Conclusion

The fruit part containing the highest average K was dried fruit (13561.94 mg/kg), followed by fruit pulp, fruit peel, seed, fresh fruit and seed shell in decreasing order. The microelement found in the highest amounts in fruits was Fe. The highest amounts of Zn in fruits and fruit parts were detected in peach and seed, respectively. Among the fruits, the highest average Al content was detected in apricot, followed by peach and plum in decreasing order. Among the fruit parts, the highest average Al was detected in the seed (1260.60 mg/kg). P, K and Ca amounts of peach were found to be higher than apricot and plum fruit. P and Mg element amounts were detected mostly in the core part. In fruit parts, the most microelements were localized in the seed the highest amounts of toxic element contents were determined in peach.

Data availability the original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding author.

Competing interests No conflict of interest

References

1. Meena, M., Shubham, S., Paritosh, K., Pareek, N., Vivekanand, V. (**2021**). Production of biofuels from biomass: Predicting the energy employing artificial intelligence modelling. Bioresource Technology, 340, 125642.
2. Bhutani, V.P., Joshi, V.K. (**1995**). Plum. In: Salunkhe, D.K., Kadam, S.S. (Eds.), Fruit science and technology: Production, composition, storage and processing, 203–241, Dekker, New York.
3. Kunachowicz, H., Nadolna, I., Iwanow, K., Przygoda, B. (**2005**). Wartość odżywcza wybranych produktów spożywczych i typowych potraw. PZWL, Warszawa.
4. Milosevic, T., Milosevic, N. (**2012**). Factors influencing mineral composition of plum fruits. Journal of Elementology, 17(3), 453–464.
5. Andrade, M.A., Ribeiro-Santos, R., Costa Bonito, M.C., Saraiva, M., Sanches-Silva, A. (**2018**). Characterization of rosemary and thyme extracts for incorporation into a whey protein based film. LWT - Food Science and Technology, 92, 497–508.
6. Ayala-Zavala, J.F., Vega-Vega, V., Rosas-Domínguez, C., Palafox-Carlos, H., Villa-Rodriguez, J.A., Siddiqui, M.W., Dávila-

Aviña, J.E., González-Aguilar, G.A. (**2011**). Agro-industrial potential of exotic fruit byproducts as a source of food additives. Food Research International, 44, 1866–1874.
7. Mirzaei-Aghsaghali, A., Maheri-Sis, N. (**2008**). Nutritive value of some agro-industrial by-products for ruminants – A review. World Journal of Zoology, 3, 40–46.
8. Dugmore, T.I.J., Clark, J.H., Bustamante, J., Houghton, J.A., Matharu, A.S. (**2017**). Valorisation of biowastes for the production of green materials using chemical methods. Topics in Current Chemistry, 375, 46.
9. Ullah, N., Hadi, F., Ullah, F., Ahmad, A., Ali, N., Jan, A.U. (**2017**). Analysis of heavy metals (Pb and Cd) in soil, peach fruit and its accumulation in human blood. International Journal of Agronomy and Agricultural Research, 10(4), 24–32.
10. Segura, R., Arancibia, V., Zúñiga, M.C., Pastén, P. (**2006**). Distribution of copper, zinc, lead and cadmium concentrations in stream sediments from the Mapocho River in Santiago, Chile. Journal of Geochemical Exploration, 91(1–3), 71–80.
11. De Temmerman, L.O., Hoenig, M., Scokart, P.O. (**1984**). Determination of "normal" levels and upper limit values of trace elements in soils. Zeitschrift für Pflanzenernährung und Bodenkunde, 147(6), 687–694.
12. Johnson, M.S., Eaton, J.W. (**1980**). Environmental contamination through residual trace metal dispersal from a derelict lead-zinc mine. Journal of Environmental Quality, 9(2), 175–179.
13. Tošić, S.B., Mitić, S.S., Velimirović, D.S., Stojanović, G.S., Pavlović, A.N., Pecev-Marinković, E.T. (**2015**). Elemental composition of edible nuts: Fast optimization and validation procedure of an ICP-OES method. Journal of the Science of Food and Agriculture, 95, 2271–2278.
14. Henriquez, C., Almonacid, S., Chiffelle, I., Valenzuela, T., Araya, M., Cabezas, L., Speisky, H. (**2010**). Determination of antioxidant capacity, total phenolic content and mineral composition of different fruit tissues of five apple cultivars grown in Chile. Chilean Journal of Agricultural Research, 70(4), 523–536.